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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 10/032,389 | 10/26/2001 | Enio Luiz Carpi | 01P11911 US | 5448 |

7590 09/16/2003

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| EXAMINER |
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BARRECA, NICOLE M

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| ART UNIT | PAPER NUMBER |
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1756

DATE MAILED: 09/16/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Applicati n N .

10/032,389

Applicant(s)

CARPI, ENIO LUIZ

Examiner

Nicole M. Barreca

Art Unit

1756

-- The MAILING DATE of this communication appears n the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-28 is/are pending in the application.
- 4a) Of the above claim(s) 24-28 is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-23 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☒ Claim(s) 1-28 are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) ✓ ✓
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4,5.

- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Election/Restrictions

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:
 - I. Claims 1-23, drawn to a method for fabricating a mask and (method for using the mask to pattern a semiconductor), classified in class 430, subclass 5.
 - II. Claims 24-27, drawn to a method for patterning a semiconductor (without a mask), classified in class 430, subclass 311.
 - III. Claim 28, drawn to a semiconductor device, classified in class 257, subclass 213.

The inventions are distinct, each from the other because of the following reasons:

2. Inventions I and II are unrelated. Inventions are unrelated if it can be shown that they are not disclosed as capable of use together and they have different modes of operation, different functions, or different effects (MPEP § 806.04, MPEP § 808.01). In the instant case the different inventions a method for making a mask and a method for patterning a semiconductor without a mask, inventions which have different functions.
3. Inventions I and III are unrelated. Inventions are unrelated if it can be shown that they are not disclosed as capable of use together and they have different modes of operation, different functions, or different effects (MPEP § 806.04, MPEP § 808.01). In the instant case the different inventions a method for fabricating a mask and a semiconductor device patterned without a mask.

4. Inventions II and III are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make other and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case the product as claimed can be made by another and materially different process. Since the product claim is written in product-by-process form, the semiconductor device may be made by any process, such as patterning exposure through a photomask having serifs.

5. Because these inventions are distinct for the reasons given above and have acquired a separate status in the art because of their recognized divergent subject matter, restriction for examination purposes as indicated is proper.

6. During a telephone conversation with Kay Houston on 8/5/03 a provisional election was made with traverse to prosecute the invention of Group I, claims 1-23. Affirmation of this election must be made by applicant in replying to this Office action. Claims 24-28 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

8. Claims 1 and 3 are rejected under 35 U.S.C. 102(a) as being anticipated by Yamato (JP-2001-236694, English translation from JPO).
9. Yamato teaches a process which irradiates a laser beam onto a photoresist coated glass substrate, wherein the laser beam has an elliptical shape. Figure 4 illustrates the long axis of the elliptical beam being used to pattern the oval features.

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. Claims 1-3, 18, 22 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Matsuura (JP 2000-066366, English translation from JPO).
12. Matsuura discloses a method for the production of a photomask. The photomask is used to expose a resist for use in the production of a semiconductor device. Photoresist 3 is coated on mask substrate 1. Circular pattern 8 formed in aperture 7 is irradiated with an electron beam 6 emitted by electron gun 5. The electron beam shaped according to the circular pattern 8 is reduced by reduction 9. The resist is irradiated by the electron beam by deflector 10 and patterned to form a circular mask pattern. Matsuura uses a circular pattern (8) to shape the electron beam into a circular beam in order to form a photomask with a circular pattern and does not disclose using an elliptical shaped beam to form oval shaped patterns on the photomask. However it would have been obvious to one of ordinary skill in the art to use an ellipse (or oval)

pattern, instead of the circular pattern 8, in order to shape the electron beam to an ellipse and form oval shaped patterns into the photomask, if the final semiconductor device being manufactured required oval instead of circular patterns. Matsuura is silent on the specific semiconductor device being manufactured and does not disclose that a MRAM or DRAM device. However both are conventional semiconductor devices whose manufacture using photolithography is well known by those of ordinary skill in the art.

13. Claims 4-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Umeki (US 5,830,605) in view of Kimura (US 4,692,583) and Yabu (US 4,907,021).

14. Umeki discloses the manufacture of a gradation mask and a method for using the gradation mask to pattern a substrate. Photoresist 3 and chromium film 2 are deposited on quartz substrate 1 (col.2,65-67). The photoresist is exposed to light through mask 4 with shielding pattern, developed and used to etch the chromium film used to form the gradation mask 5 with a stepwise surface profile (fig.1a-1g). The gradation mask is then used to expose optical material 7 formed on substrate 6, forming pattern 7' (fig.3a-3b). A smoothing treatment is incorporated into the fabrication of the gradation mask in order to form a smooth surface profile. One such smoothing treatment is a thermal treatment so as to curve the peripheral edge of the patterned mask (col.10, 18-22, col.10, 64-67).

Umeki is silent on the specific thermal treatment and does not disclose using an elliptical shaped energy beam to reduce the stair step portions. Kimura teaches that a conventional surface heat treating apparatus has an elliptical configuration (col.1, 11-22). It would have been obvious to one of ordinary skill in the art to use an elliptical

shaped energy beam for the thermal treatment to smooth the stair step shaped edges of the photomask in the method of Umeki because Kimura teaches that this is a conventional heat treating apparatus.

Umeki uses the photomask to form an optical device such as a liquid crystal display device and does not use the photomask to form a semiconductor device. However it is conventional in the art to use photomasks to form patterns in the manufacture of semiconductors, such as DRAM, and in the manufacture of liquid display devices, as taught by Yabu (col.1, 11-30). It would have been obvious to one of ordinary skill in the art to use the photomask in the method of Umeki to form a pattern in the manufacture of a semiconductor device, instead of in the manufacture of a liquid crystal display, because Yabu teaches that photomasks are conventionally used in the manufacture of both semiconductors and liquid crystal display devices.

Conclusion

15. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Carpio (US 6,214,496) teaches using an elliptical beam to reduce corner rounding in photomask fabrication.

16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nicole M. Barreca whose telephone number is 703-308-7968. The examiner can normally be reached on Monday-Thursday (8:00 am-6:30 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Huff can be reached on 703-308-2464. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

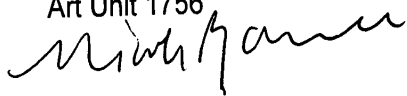
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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

Nicole Barreca
Patent Examiner
Art Unit 1756



9/10/03